Nuclear Geophysics

A Journal of Nuclear Techniques in the Earth and Environmental Sciences, Minerals Exploration, Mining and Process Control

List of Contents and Author Index

Volume 7, 1993

PERGAMON PRESS

OXFORD · NEW YORK · SEOUL · TOKYO

NUCLEAR GEOPHYSICS

EDITOR-IN-CHIEF

C. G. CLAYTON, *Sprole House, 125 Knights End Road, March, Cambridgeshire PE15 9QD, England*

EDITORS

J. CSIKAI, *Institute of Experimental Physics, Kossuth University, Bem ter 18/a, Pf. 105, 4001 Debrecen, Hungary*

J. A. CZUBEK, *Henryk Niewodniczanski Institute of Nuclear Physics, ul Radzikowskiego 152, 31-342 Krakow, Poland*

V. I. FERRONSKY, *Water Problems Institute, 103064 Moscow K-64, Sadovaja-Chernogrjazskaya 13/3, Russia*

T. FLORKOWSKI, *Institute of Physics and Nuclear Techniques, Academy of Mining and Metallurgy, al. Mickiewicza 30, 30-059 Krakow, Poland*

R. P. GARDNER, *Center for Engineering Applications of Radioisotopes, North Carolina State University, Raleigh, NC 27695-7909, U.S.A.*

P. G. KILLEEN, *Mineral Resources Division, Geological Survey of Canada, 601 Booth Street, Ottawa, Ontario, Canada K1A 0E8*

D. A. KOZHEVNIKOV, *Kathedra of Geophysical Research in Boreholes, Moscow Ghubkin Institute of Oil Chemistry & Gas Industry, Moscow 117917, Leninsky Prosp. 65, Russia*

W. R. MILLS, *1808 Manor Lane, Plano, TX 75093, U.S.A.*

J. S. SCHWEITZER, *Schlumberger-Doll Research, Old Quarry Road, Ridgefield, CT 06877-4108, U.S.A.*

F. E. SENFTLE, *Department of Physics, Howard University, Washington, DC 20059, U.S.A.*

A. B. TANNER, *12125 Captiva Court, Reston, VA 22091-1204, U.S.A.*

J. S. WATT, *CSIRO Division of Mineral Engineering, Private Mail Bag 7, Menai, NSW 2234, Australia*

M. R. WORMALD, *AEA Industrial Technology, Harwell Laboratory, Oxfordshire OX11 0RA, England*

Published Quarterly in March, June, September and December

Copyright © 1993 Pergamon Press Ltd

Publishing Office

Pergamon Press Ltd, Pergamon House, Bampfylde Street, Exeter EX1 2AH, England
[*Tel.* Exeter (0392) 51558; *Fax* 425370].
Production Editor: Joanne Hockin

Subscription and Advertising Offices

North America: Pergamon Press Inc., 660 White Plains Road, Tarrytown, NY 10591-5153, U.S.A.
Rest of the World: Pergamon Press Ltd, Headington Hill Hall, Oxford OX3 0BW, England
[*Tel.* Oxford (0865) 794141].

Subscription Rates

Annual Institutional Subscription Rates 1994: North, Central and South America, U.S.$520.00, Rest of World £339.00. Sterling prices exclude VAT. Non-VAT registered customers in the European Community will be charged the appropriate VAT in addition to the price listed. Prices include postage and insurance and are subject to change without notice.

Back Issues

Back issues of all previously published volumes, in both hard copy and on microform, are available direct from Pergamon Press offices.

Second class postage paid at RAHWAY NJ. Postmaster send address corrections to *Nuclear Geophysics*, c/o Pergamon Press Inc., 660 White Plains Road, Tarrytown, NY 10591-5153, U.S.A.

List of Contents

NUMBER 1

J. A. Czubek 1 Neutron parameters of brines

R. D. Wilson and **J. G. Conaway** 35 Simulations of spectral gamma-ray logging tool response to formation and borehole wall source distributions

J. G. Conaway, R. D. Wilson, D. J. Krier, M. A. Mathews and **J. W. Barber** 55 Errors in spectral gamma-ray logs resulting from radon daughters in boreholes

James P. Granger, Hugh E. Hall Jr and **Vernon Groeschel** 65 Optimum thickness of Li glass neutron detectors in mixed radiation fields

J. S. Reid, T. A. Cahill, E. A. Gearhart, R. G. Flocchini, J. S. Schweitzer and **C. A. Peterson** 81 Elemental analysis of Kuwaiti petroleum and combustion products

J. I. W. Watterson 87 Optimization of geometrical and spectral factors for the determination of carbon in coal by neutron-induced prompt gamma-ray analysis

E. J. Uwah 97 Analyses and interpretations of air-borne gamma-ray survey data for radioactive mineral recovery: a case study of Ugep Area, S.E. Nigeria

C. Papastefanou 109 Evaluation of uranium–lead (U–Pb) and thermoluminescence (TL) methods in dating fossil bones

Li Guodong 115 Uranium fission coefficients in the instrumental neutron activation analyses (INAA) of geological samples

International Atomic Energy Agency Consultants Meeting Contributions

Edward Chruściel, Nguyen Dinh Chau and **Jerzy W. Niewodniczański** 119 Gamma–gamma spectrometric well logging for hard coal

M. Borsaru, P. Millitz and **C. Ceravolo** 125 Comparison between the neutron–gamma and gamma–gamma techniques for ash prediction in 140 mm diameter quality control holes at the Callide Mine

J. Charbucinski 133 Comparison of spectrometric neutron–gamma and gamma–gamma techniques for *in situ* assaying for iron grade in large diameter production holes

Announcement i

NUMBER 2

C. G. Clayton and **J. S. Schweitzer** 143 A review of aspects of nuclear geophysics

J. A. Grau, J. S. Schweitzer, J. K. Draxler, H. Gatto and **J. Lauterjung** 173 Elemental logging in the KTB Pilot Hole—I. NaI-based spectrometry

C. W. Tittle and **Warren E. Ferguson Jr** 189 The use of diffusion theory to compute invasion effects for the pulsed neutron thermal decay time log

S. A. Ghanem, R. P. Gardner and **K. Verghese** — 197 Monte Carlo simulation of the gamma-ray backscatter lithodensity logging tool response

W. A. Gilchrist Jr, M. W. Mickael and **C. W. Towsley** — 209 An examination of the effects of drilling-mud filter-cakes on compensated neutron measurements using Monte Carlo calculations

Benoît Couët and **Charles Watson** — 215 Applications of Monte Carlo differential neutron sensitivity calculations to geophysical measurements

M. W. Mickael — 231 Monte Carlo modelling of the response of pulsed neutron decay instruments

C. M. Shyu, R. P. Gardner and **K. Verghese** — 241 Development of the Monte Carlo–library least-squares method of analysis for neutron capture prompt gamma-ray analyzers

R. P. Gardner, C. L. Dobbs, J. Szalanski and **K. Verghese** — 269 The Measurement Chi-Square (χ^2_M) Approach for dual nuclear gauges

C. Oliveira, J. Salgado and **F. G. Carvalho** — 285 Optimization of PGNAA instrument design for bulk coal analysis

A. J. Niemi, J. Thereska, E. Plasari and **M. Kaçaj** — 305 Tracer studies of flotation in the laboratory and in mineral processing plant

L. Petryka, L. Furman, K. Przewłocki and **Z. Stęgowski** — 313 Radioisotope investigations of the copper ore dressing process

L. Petryka and **J. Oszajec** — 323 The cross-correlation method of solid particle velocity measurements in industry

Z. Stęgowski — 335 Accuracy of the residence time distribution function parameters

Lawrence H. James — 343 On the determination of the effective volume of a gamma ray density gauge in backscatter mode

Hideharu Matsuda — 353 A spectrometric method of evaluating soil moisture using terrestrial gamma-rays

Naoto Fujinami, Shinobu Esaka and **Susumu Minato** — 359 Estimation of cloud parameters from short-lived Rn daughter activities of rainwater

NUMBER 3

I. Lerche — 367 Geological implications of radium and helium in oil-field brines: observations, inferences and speculations

Susan L. Herron and **Joseph M. Chiaramonte** — 375 Impact of element-to-mineral matrix concentration errors on geochemical log interpretation

Michael M. Herron and **Abigail Matteson** — 383 Elemental composition and nuclear parameters of some common sedimentary minerals

M. A. Arnautova, Ya. Z. Kandiev, B. E. Lukhminsky and **G. N. Malishkin** — 407 Monte Carlo simulation in nuclear geophysics. Intercomparison of the PRIZMA Monte Carlo program and benchmark experiments

I. G. Dyadkin — 419 Random number generators in support of Monte Carlo problems in physics

C. Oliveira, J. Salgado, I. F. Gonçalves, F. G. Carvalho and **F. Leitão** — 431 Prompt gamma-ray neutron activation analysis of cement raw materials

P. J. Jojo, A. Rawat, Ashavani Kumar and **Rajendra Prasad** — 445 Trace uranium analysis in Indian coal samples using the fission track technique

I. Othman, G. Raja, M. Al-Hushari and **R. H. Iyer** — 449 Application of a portable ^{241}Am–Be neutron source for the trace analysis of uranium in different matrices

Harinder Kaur, S. K. Gill, S. K. Sahota, G. P. S. Sahota and **H. S. Sahota** — 455 A method for quantitative estimation of activity due to various radionuclides in the terrestrial ambient environment

M. C. Gallardo, M. García-León, M. Mundi and **M. A. Respaldiza** — 461 Gamma-spectrometric analysis of river sediments collected around phosphate fertilizer industries

Jiunn-Hsing Chao and **Chien Chung** — 469 *In situ* elemental measurements in an environmental water body by prompt gamma-ray spectrometry

NUMBER 4

S. S. Raghuwanshi and **B. K. Bhaumik** — 479 Rule-building expert system for the identification of airborne radiometric anomalies

D. G. Hill — 497 Density log errors due to high grade uranium ores

P. G. Killeen, K. A. Pflug, C. J. Mwenifumbo, R. L. Zelmer and **B. A. McCallum** — 501 Application of spectral gamma-ray logging to low-level radioactive waste management studies at Port Hope, Ontario, Canada

U. B. Jayanthi, O. L. Gonçalez, A. M. G. Figueiredo, L. S. Y. Rigolon and **K. A. Jayanthi** — 515 A neutron activation technique for the analysis of cryolite in core samples

International Atomic Energy Agency Consultants Meeting Contributions

N. G. Cutmore, B. D. Sowerby and **J. S. Watt** — 519 On-line analysis of coal

T. Cywicka-Jakiel, J. Łoskiewicz and **G. Tracz** — 529 The use of a hydrogen signal in correcting the carbon concentration from $^{12}C(n,n'\gamma)^{12}C$ reaction in coal

M. Borsaru, M. S. Biggs and **W. J. F. Nichols** — 539 Neutron-gamma logging for iron in coal and implications for estimating the ash fusion characteristics at Callide Mine

Edward Chruściel, Joseph L. Makhabane and **Jerzy W. Niewodniczański** — 547 Natural radioactivity studies of rocks from Upper Silesia Hard Coal Basin

A. Abedinzadeh, H. Rahimi, N. Rahimi, A. Amini, A. Naimpour, J. Moafian and **A. Banisalam** — 553 Primary investigation of a design for a dual energy gamma-ray transmission gauge to determine the ash content of coal on a conveyor belt

M. Borsaru — 555 Nuclear techniques for *in situ* evaluation of coal and mineral deposits

AUTHOR INDEX

Abedinzadeh A., 553
Al-Hushari M., 449
Amini A., 553
Arnautova M. A., 407

Banisalam A., 553
Barber J. W., 55
Bhaumik B. K., 479
Biggs M. S., 539
Borsaru M., 125, 539, 555

Cahill T. A., 81
Carvalho F. G., 285, 431
Ceravolo C., 125
Chao J.-H., 469
Charbucinski J., 133
Chiaramonte J. M., 375
Chruściel E., 119, 547
Chung C., 469
Clayton C. G., 143
Conaway J. G., 35, 55
Couët B., 215
Cutmore N. G., 519
Cywicka-Jakiel T., 529
Czubek J. A., 1

Dobbs C. L., 269
Draxler J. K., 173
Dyadkin I. G., 419

Esaka S., 359

Ferguson W. E. Jr, 189
Figueiredo A. M. G., 515
Flocchini R. G., 81
Fujinami N., 359
Furman L., 313

Gallardo M. C., 461
García-León M., 461
Gardner R. P., 197, 241, 269
Gatto H., 173
Gearhart E. A., 81
Ghanem S. A., 197
Gilchrist W. A. Jr, 209
Gill S. K., 455
Gonçalez O. L., 515
Gonçalves I. F., 431
Granger J. P., 65
Grau J. A., 173
Groeschel V., 65

Hall H. E. Jr, 65
Herron M. M., 383
Herron S. L., 375
Hill D. G., 497

Iyer R. H., 449

James L. H., 343
Jayanthi K. A., 515
Jayanthi U. B., 515
Jojo P. J., 445

Kaçaj M., 305
Kandiev Ya. Z., 407
Kaur H., 455
Killeen P. G., 501
Krier D. J., 55
Kumar A., 445

Lauterjung J., 173
Leitão F., 431
Lerche I., 367
Li Guodong, 115
Łoskiewicz J., 529
Lukhminsky B. E., 407

Makhabane J. L., 547
Malishkin G. N., 407
Mathews M. A., 55
Matsuda H., 353
Matteson A., 383
McCallum B. A., 501
Mickael M. W., 209, 231
Millitz P., 125
Minato S., 359
Moafian J., 553
Mundi M., 461
Mwenifumbo C. J., 501

Naimpour A., 553
Nguyen Dinh Chau, 119
Nichols W. J. F., 539
Niemi A. J., 305
Niewodniczański J. W., 119, 547

Oliveira C., 285, 431
Oszajec J., 323
Othman I., 449

Papastefanou C., 109
Peterson C. A., 81
Petryka L., 313, 323
Pflug K. A., 501
Plasari E., 305
Prasad R., 445
Przewłocki K., 313

Raghuwanshi S. S., 479
Rahimi H., 553
Rahimi N., 553
Raja G., 449
Rawat A., 445
Reid J. S., 81
Respaldiza M. A., 461
Rigolon L. S. Y., 515

Sahota G. P. S., 455
Sahota H. S., 455
Sahota S. K., 455
Salgado J., 285, 431
Schweitzer J. S., 81, 143, 173
Shyu C. M., 241
Sowerby B. D., 519
Stęgowski Z., 313, 335
Szalanski J., 269

Thereska J., 305
Tittle C. W., 189
Towsley C. W., 209
Tracz G., 529

Uwah E. J., 97

Verghese K., 197, 241, 269

Watson C., 215
Watt J. S., 519
Watterson J. I. W., 87
Wilson R. D., 35, 55

Zelmer R. L., 501

PRINTED AND BOUND IN GREAT BRITAIN BY BPCC WHEATONS LTD, EXETER